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PLANT REQUIREMENTS FOR MANUFACTURE OF WIRE PRODUCTS

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FOREWORD

This brochure is one of a series of reports resulting from overseas technical inquiries on factory or commercial establishments, operation, management, and engineering. The report is designed to provide only a general picture of the factors that must be considered in establishing and operating a factory of this type. In most cases, plans for actual installations will require expert engineering and financial advice in order to meet specific local conditions.

Mention of the name of any firm, product, or process in this report is not to be considered a recommendation or an endorsement by the International Cooperation Administration, but merely a citation that is typical in its field.

Industrial reports prepared for ICA under special contract are customarily reviewed and edited before publication. This report, however, like other technical inquiry replies, has not been reviewed; it is the sole responsibility of the firm that prepared the report.

This brochure was prepared in September 1957 by the Wolf Management Engineering Company, Chicago, Illinois.

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For further information and assistance, contact should be made with the local Productivity Center, Industrial Institute, Servicio, or United States Operations Mission.

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W I R E P R O D U C T S

INTRODUCTION

This report concerns the cost and economic feasibility of establishing a wire products factory. The findings and recommendations presented are based upon the following production volumes:

1. Approximately 5 million kilograms of 2mm to 8mm (0.07874 - 5/64-inch to 0.3196 - 5/16-inch) diameter ferrous round wire.

2. Approximately 2 million kilograms of 0.5mm to 2mm (0.01968 to 0.0784) diameter ferrous round wire.

3. Approximately 3 million kilograms of ferrous wire fencing of unstated sizes and varieties.

4. Approximately 9 million kilograms of ferrous barbed wire fencing.

In regard to the relatively lower wage rates prevailing in most countries compared to those paid in the United States, attention should be directed to the fact that wire drawing and fencing fabrication operations are principally of a machine-produced nature and require actual manual labor to a small degree. Consequently, the wide differences in foreign and United States hourly labor rates become a factor of no great importance.

Especially would this factor be worthy of consideration when a manufacturer must make a number of machine adjustments in order to produce short runs of several kinds and sizes of wire.

In the United States, the volume demand for most wire products is so great - this notwithstanding the tremendous output of modern machines and equipment - that frequently individual machines continually produce a single product. And because, in the United States, the demand for the single products is so great, the necessary investment is made to acquire every available labor-saving device.

In instances where runs of individual products are relatively short, it is necessary to man individual machines. When market demands for the products are large, machines can be operated to continuously produce the same product, and one operator can attend several machines.

Thus, a per-unit labor cost reduction is made possible largely because machines continue to produce an individual product over long periods of time without loss of time to effectuate change-overs which require an expenditure of supervisor and operator time.

On the topic of differences in hourly labor rates between one country and another, it is well to consider the favorable effect on over-all costs when experienced workers and properly qualified supervisors are employed in the several distinct phases of wire manufacture.

A high degree of skill at the machine operator level is not quickly acquired. The art of wire drawing began before the days of recorded history, and through the ages has developed, by process of trial and error, to its present highly technical state of development.

Much of the wire drawing technology has been recorded in standard textbooks. However, in American wire mills, men must spend several years at the apprentice level before acquiring sufficient skill to enable them to advance to the journeyman status. Then they must spend many years at a journeyman level before they are qualified for supervisory positions.

Wire drawing requires workers and supervisors skilled in processing many different alloys of metals; skilled in the proper design and utilization of tooling; skilled in the efficient use of materials and equipment; familiar with chemical and metallurgical processes; and possessing the ability to control the flow of production.

There are two possible ways to acquire the essential know-how to conduct a successful wire drawing venture. One is to make the necessary investment to acquire the essential facilities, employ untrained labor and train them to utilize the facilities efficiently and economically.

The procedure described below, however, is the favored method. Gigantic American enterprises, such as the leading steel mills, are staffed with many highly qualified technicians who restrict their attention to specific phases of the operations of these companies. Yet, during the design stages of a transition from an already existing plant to an enlarged or improved manufacturing operation, these companies do not rely solely upon their own specialized technicians.

Once a steel corporation, for instance, decides to augment its wire drawing facilities in order to attain increased capacity, its efforts are exerted in the direction of obtaining a lower cost operation by acquiring the most modern and efficient facilities possible. Increasing capacity by obtaining more facilities of the same kind they already have and not taking advantage of the latest machine developments would not be taking a forward step toward a more competitive position.

Competition likewise impels machinery and equipment manufacturers to continuously improve their products. Therefore, they nearly always have improved designs of machinery and equipment in varying stages of design engineering. By collaborating with machinery makers, the technical forces of steel mills are able to evolve a character of operation somewhat superior to that which heretofore has existed. The machine hourly rate of production and the quality of the finished product are stepped up, and the labor cost of production is reduced.

Most successful American enterprises are aware of the benefits to be realized from close collaboration with manufacturers of processing and fabricating equipment when occasions arise to replace facilities or expand capacity. The prospective manufacturer of barbed wire is therefore urged to embrace a similar policy and seek the expert advice and direction of the engineering staffs of the manufacturers of the various types of machinery and equipment needed to evolve an economically feasible wire products operation.

MACHINERY AND EQUIPMENT FOR PRODUCING WIRE*

It is, of course, impossible to furnish unqualified machinery and equipment specifications without making a thorough study of the individual situation, and, since costs of equipment vary widely due to the nature of the individual manufacturers' designs, the following preliminary data are supplied in the expectation that these will give the information necessary to comprehend the nature of the facilities required and their probable costs.

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* Machinery and equipment described under this heading are manufactured by the Morgan Construction Co., Worcester, Massachusetts.

The requirements for drawing equipment are presumed to be a follows:

4,600 metric tons per year of 8mm to 2mm wire.
1,810 metric tons per year of 2mm to 0.5 mm wire.
3,000 metric tons per year of chain link fence.
9,000 metric tons per year of barbed wire.

It is understood that the smaller sizes of wire will be drawn from #5 low carbon rod with starting tensile of about 65,000 p.s.i.

The breakdown of the tonnages in each size of wire from 8mm to .5mm will vary the equipment required for this work. Chain link fence is made of #9 (3.6mm) and #11-1/2 (2.9mm) gage wire, and the breakdown of the tonnages between the two sizes will also affect the equipment required. Barbed wire is made of #12-1/2 gage (2.5mm) wire for the strand and #14 gage (2mm) for the barbs, with about 75 percent of the total tonnage being in the #12-1/2 gage size, and 25 percent in the #14 gage wire.

Without the breakdown of tonnages in each size, it is impossible to give exact data on the equipment required. However, data are given on equipment which will cover the total tonnage of about 14,400 metric tons per year, or about 60 metric tons per day, of wire in an over-all range of sizes. This information is for estimating purposes only.

The requirements of 60 metric tons per day have been broken down into sizes, number of drafts required, kilos required per hour, and speed of drawing for various sizes of wire. From these data, the number and types of machines required for producing the tonnage requirement have been determined.

All the machines selected are suitable for high-speed drawing of low-carbon wire. If, at some future date, the mill will be drawing high-carbon patented wire, other equipment should be selected which will be suitable for drawing either high or low-carbon wire.

The single-spindle machine with double-deck block suggested is the Morgan Wire Block. The continuous machines are Morgan-Connor Wire Drawing Machines. The following specifications apply to both the Morgan Wire Block and the Morgan Wire Machines:

Drafting Practice

The Morgan Wire Block is suitable for 30 percent reduction on the double-deck block and requires a lower-deck block of about 455mm in diameter. The lower-deck block is made to specifications in any diameter in excess of 405mm. The upper-deck block is 650 mm in diameter.

The Morgan-Connor Continuous Wire Machines can be geared to meet requirements for minimum draft. As the machines are to be suitable for low-carbon wire, the minimum draft required will be about 25 percent, which will permit taking of reductions in a range of about 25 to 35 percent per draft.

Handling Equipment

All finishing blocks are deep slotted for collapsing strippers, which can be entered in the block after the wire is drawn.

The Rod Breakdown Machines are equipped with stripper slots on all blocks so that any block may be used as a finishing block.

The specifications and prices for cranes or hoists for handling the strippers are not included.

Cooling

All continuous machines are completely air-cooled. The air is supplied by a motor-driven fan which is included with the machine. The cooling system, which permits rapid cooling of the wire, preserves the coating when drawing low-carbon wire and results in long die life.

Die and Lubricant Boxes

The die boxes are adjustable so that the proper lead into the following block can be obtained.

Lubrication of Machines

The machines are automatically lubricated except for the guide sheaves. Gear units supplied have automatic lubrication separate from the machine. Motors are separately lubricated in accordance with the maker's instructions. On the Morgan Wire Block, lubrication for gears and bearings is from a pump integral with the machine.

The block spindles are bevel gear driven. The gears are lubricated by dipping in the oil. Bearings which are above the oil level are lubricated from a pump built integral with the machine.

Accessories

The following accessories are quoted as separate items:

1. Pointer for Wire Block

The pointer is a Morgan #1105 Pointer. It has 90mm diameter, constantly-revolving rolls with eccentric grooves and is equipped with a shear. The rolls are grooved to start from 9-1/2mm and make about 2.8mm as the finest point. The pointer is driven by a 3 hp. a.c. squirrel-cage gear motor. It is furnished complete with motor, magnetic starter and stop-start push-button.

2. Pointers for Type B Machines

The pointer suggested is a 2-inch motor driven pointer. It has 50mm diameter, constantly-revolving rolls and is equipped with a shear. The rolls are grooved to start from 6mm diameter low-carbon rods and make about 1.4mm diameter as the finest point. The motor is a 1-1/2 hp. a.c. motor. A magnetic starter and foot-operated push-button are included.

3. Pointers for Intermediate Machines

The pointer suggested for the Type C Machine is the 2-inch hand pointer, which is designed for starting up to 3.7mm diameter low-carbon annealed wire. This pointer has 50mm diameter hardened steel rolls, which are grooved to point down to about .75mm as the finest point.

Safety Features

The starting bar, which also acts as a safety bar, extends the full length of the machine. There is a safety bar at the end of the machine at the finishing block. A hinged backboard stop is included. Both sides of the wire block are protected with a safety stop. A safety loop or snarl stop is provided between the reel and the entering end of the machine on all machines. The wire block has an automatic shutdown if the wire breaks or when the back end of the coil runs through the die. Braking is provided on all driving motors. On direct-current motors, this is accomplished by dynamic braking. On alternating-current motors, this is accomplished by applying d.c. current to one phase of the a.c. motor from a d.c. source supplied by a transformer and rectifier within the magnetic control.

All gearing is totally enclosed. The only exposed rotating parts, other than the wire drawing blocks, are the couplings. These are covered with substantial guards which can be easily removed.

The a.c. electrical equipment is for use on 440-volt, 3-phase, 60-cycle current. Direct-current electrical equipment for the wire blocks is for use on 230-volt current operating from an individual motor-generator set

included as part of the control and all operating from 440-volt, 3-phase, 60-cycle current lines.

All motors are ball-bearing, with tight covers on all top openings and screen covers on all bottom openings. The d.c. motors are 55°C. rise, and the a.c. motors are 50°C. rise with covers as specified. The d.c. motors are shunt-wound motors. The a.c. motors are wound rotor motors.

The controls give slow start, gradual acceleration, and quick stopping On the wire block, reversing for spotting the grip is provided. Overload and undervoltage protection is included.

The controls are in a Nema Type 1A, semi-dust-tight, floor-mounted cabinet. The resistors are mounted in a ventilated enclosure and are wired to the panel.

Morgan Wire Block Machine # 238 (Figure 1)

This machine is a single-block vertical spindle wire drawing machine direct-connected to an electric motor. It is started and stopped by starting and stopping the motor. The transmission from the motor to the block is by spiral bevel and helical gears. This transmission operates quietly and at high efficiency.

Safety devices are provided for the protection of the operator.

A space about 9.1 × 3 meters is required for economical operation of the machine. Approximate shipping weight of the machine with electrical equipment is 5,000 kilos.

The machine is equipped with a double-deck block with the diameter of the top deck 650mm. The block is deep slotted for a collapsing stripper. The machine is built so that an interchangeable 560mm block can be supplied at a later date.

The machine is built suitable for a 550 kilo coil of wire, if it is desired to draw bundles of this size at some later date. It is driven by an adjustable-speed d.c. motor. Block speeds are 300/900 f.p.m.

The capacity of the machine for drawing from hot-rolled low-carbon rods having a tensile strength of 65,000 lbs. per square inch is as follows:

3/8-inch to 5/16-inch - 600 f.p.m.
1/4-inch, two drafts - 900 f.p.m.
5/16-inch or 1/4-inch, single-draft - 600 f.p.m.
2-draft, #9 from #5 rod - 900 f.p.m.

The limitation of 600 f.p.m. is imposed by the maximum speed of unwinding the rods from the reels. At drawing speeds higher than 600 f.p.m., single-draft, unwinding difficulties may be encountered. Two-draft wire can be drawn at 900 f.p.m. without difficulty at the reel.

The d.c. driving motor is 60/75 hp. with a speed range of 500/1,500 f.p.m. The power is from a variable voltage driving unit giving tapered horsepower by motor field control over a speed range of 300/900 f.p.m. A suitable motor-generator set and controls are included, giving lower speeds at constant torque by generator field control. The a.c. side of the motor-generator set is for use on 440-volt, 3-phase, 60-cycle current.

Multiple Spindle Wire Drawing Machines (Figures 2 and 3)

The Multiple Spindle Continuous Wire Drawing Machines for drawing from #5 rods are the Type B machine.

Additional specifications are as follows:

All blocks are slotted for a collapsing stripper, so any block can be used as the finishing block.
All blocks are 560mm in diameter.
All intermediate blocks are equipped with clutches, so welded rod coils can be drawn.
Low-carbon rods #5 can be started on the first or second block.

Accessories furnished with each machine are:

Grip for starting the wire.
Water-cooled die holders.
Motor-driven fan for supplying the cooling air.
Tilting-type snarl stop.
Collapsing stripper for the finishing block. (Crane for the stripper is not specified.)

The driving motors are 100 hp., a.c. wound, rotor induction motors with solid covers on top openings and screen covers on bottom openings. The motors are for operation from 440-volt, 3-phase, 60-cycle current.

Working space required for each machine is:

4-block machine - 9.1 X 3 meters
5-block machine - 10.5 X 3 meters
6-block machine - 10.5 X 3 meters

Weight of each machine with motor is:

4-block machine - 8,200 kilos
5-block machine - 9,100 kilos
6-block machine - 10,000 kilos

Intermediate Machines (Figure 3)

Intermediate drawing of wire is accomplished by using a Type C machine with six blocks.

The Continuous Wire Drawing Machine, Type C, is suitable for starting up to 3.7mm diameter low-carbon annealed wire or about 3.4mm diameter hard, drawn low-carbon wire. All these sizes may be started on the first or second block. Intermediate blocks are 304mm in diameter.

Finishing block is 304mm or 406mm in diameter. The finishing block is equipped with deep slots for a collapsing stripper. Intermediate blocks are equipped with clutches so welded wire coils can be drawn. The machine is completely air-cooled.

Accessories for each machine are:

Grip for starting the wire.
Water-cooled die holder.
Motor-driven fan for supplying the cooling air.
Tilting-type snarl stop.
Collapsing stripper for the finishing block.
(Crane for the stripper is not specified.)

Approximate amount of working space required is 10.5 X 2.25 meters per machine. Weight of the machine with motor is 5,300 kilos.

Galvanizing Equipment

It is estimated that equipment is needed to galvanize approximately 50 metric tons of wire per day with the production consisting mainly of #9, #11-1/2, #12-1/2 and #14 gage wire and some #20 gage wire. In order to galvanize this tonnage of wire in 24 hours, about 40-wire lines will be required.

For use with a suitable galvanizing furnace, the Morgan #500 Take-Up Frame is suggested.

The blocks are on horizontal shafts with 20 blocks on one side of the frame and 20 blocks on the other side. The blocks are driven by worm gearing. The blocks on one side of the machine make counter-clockwise-wound coils and the blocks on the opposite side make clockwise-wound coils.

The frame is completely enclosed with a sheet-metal enclosure. A single guide sheave is provided over each block. Nested sheaves are provided at one end of the frame for guiding the wire to the block.

The blocks shown are of alloy cast-iron, heat-treated to a Brinell in excess of 550 to give a long-wearing surface. The blocks are on 36-1/2-inch center distances. Blocks would probably be made up of two units of 20 each. Each unit would be driven by an adjustable-speed d.c. motor. The drive motor is complete with control, and the individual motor-generator is set for operation from 440-volt, 3-phase, 60-cycle current a.c. lines. The drive will provide an 8-to-1 speed range at constant torque.

Cleaning House

Detailed specifications and recommendations are not given for the cleaning house.

A cleaning house should have two acid tanks, each capable of holding two hooks of about 1,000 kilo capacity. The acid tubs can be made of concrete, lined with acid brick.

Also required are rinse and washtubs, a coating tank, and a "baker." These tubs and the "baker" are to be set in a straight line, and the line should be serviced by a Gantry crane.

If lime is used, a flash "baker" is required to dry the lime and drive off any occluded hydrogen resulting from the chemical action between the sulfuric acid and the steel. The lime is eliminated with the use of a borax compound. In a tropical climate, the "baker" should be used with a borax coating.

The borax solution is not corrosive and may be used in a steel or wooden tank. The solution is heated by means of steam coils to just under the boiling point of 100°C. Closed steam coils should be used to prevent dilution of the coating compound solution. Steam is also required for heating the acid in the acid tank. A cleaning line, as described, should clean 60 tons of rods per day in one shift. One man will be required to operate the line, with helpers to bring the rods to the cleaning house and to take the cleaned rods away.

Die Room

A die room will be required. The die room will contain equipment for servicing and polishing the carbide dies used in the wire drawing process. Equipment consists of polishing equipment, bench lathes and lapping compounds, as well as dies. Space of about 4 X 4 meters will be required.

Annealing Equipment

No mention has been made of annealing equipment. The wire for barbed wire and chain link fence will be annealed in the galvanizing process. It may be that the chain link fence will be woven from hard drawn wire and then galvanized after weaving so that annealing will not be required. This detail would have to be worked out subsequently.

There may be requirements for some of the wire to be bright annealed. If so. bell-type annealers should be supplied.

If chain link fence is galvanized after annealing, requirements for galvanizing will change.

Sizes of Wire Produced

The wire block machine will be used for drawing large sizes of wire fron 8mm to about 3.7mm wire. The 4-block, Type B machine will be used for drawing wire in a range of sizes from 2.9 to 3.6mm diameter from a #5 rod for manufacture into chain link fence.

The two 5-block machines will be used for drawing 2-1/2mm wire and 2mm wire for manufacture into barbed wire.

The two 5-block machines will be used continuously, 24 hours a day, on these sizes of wire for the manufacture of 9,000 tons of barbed wire per year.

The 6-block machine will be used for the manufacture of wire sizes down to as small as 1-1/2mm drawn from a #5 rod. This machine, as well as the 4-block machine, will also be used for breaking down rods to a starting size to be put onto the intermediate machines which finish wire in a range of sizes from about 1.3mm to .5mm.

ESTIMATED COST OF

MACHINERY AND EQUIPMENT

FOR PRODUCING WIRE*

Wire Drawing Machines

Vertical wire block

1 Morgan #238 Vertical Wire Block, with double-deck block, with 60/75 hp. d.c. motor and control, and individual motor-generator set, all for operation from 440-volt, 3-phase, 60-cycle current	$ 30,900.00
Boxing charge	1,500.00

Continuous Wire Drawing Machines

1 Type B, 4-block, with 100 hp. a.c. motor, control and three-speed selective gear unit to give three operating speeds of the machine	34,100.00
Boxing charge	1,950.00
2 Type B, 5-block machines, with 100 hp. a.c. motor and control, and three-speed selective gear unit to give three operating speeds of the machine, each	37,600.00
Boxing charge, each	2,150.00
1 Type B, 6-block machine, with 100 hp. a.c. motor and control, and three-speed selective gear unit to give three operating speeds of the machine	41,750.00
Boxing charge	2,350.00
3 Type C, 6-block intermediate machines, with 60 hp. a.c. motor and control, and three-speed selective gear unit to give three operating speeds of the machine, each	33,400.00
Boxing charge on each	2,500.00

Accessory Equipment

The following accessories will be required for use with the wire drawing machines:

Double turntable flipper reels used as pay-off stands, each	800.00
Boxing charge on each	125.00

* Prices are for machinery and equipment manufactured by the Morgan Construction Co., Worcester, Massachusetts.

Accessory Equipment (Cont'd)

1 #1105 Motor-Driven Pointer, for use with Vertical Wire Block #238	$ 2,400.00
Boxing charge	175.00
4 Motor Driven Pointers, 2-inch, for use with Type B machines, each	950.00
Boxing charge on each	75.00
3 Hand Pointers, 2-inch, for use with Type C machines, ea. (If the pointers are shipped with the machines, there is no boxing charge.)	185.00
8 welders (one for each wire drawing machine)* each	1,000.00

Galvanizing Equipment

A complete galvanizing furnace, consisting of a lead-annealing pan setting; pickle, rinse and flux tank installation; one galvanizing pot setting; all complete with burners, temperature and safety control and combustion air blower for use with the galvanizing and annealing baths	80,000.00
Boxing charge	5,000.00
1 Morgan #500 40-Block Galvanizing Take-Up Frame, with 22-inch diameter blocks, complete with motors, controls and motor-generator sets	110,000.00
80 Pay-Off Reels for use with the galvanizing furnace. (These can be easily built locally. It is not economical to have them manufactured in the United States and shipped to a foreign country. The manufacturers of take-up frames usually furnishes drawings from which the pay-off reels can be manufactured.)	- -

Cleaning House

Complete cleaning house equipment for the cleaning and coating of about 60 metric tons of rods per day, and including the Gantry crane will cost approximately	75,000.00
Concrete tanks, rinse tanks and other tanks should be built locally	- -

* Estimate of the Micro Products Corporation, 20 North Wacker Drive, Chicago, manufacturers of suitable welders.

Annealing Equipment

Suitable bell-type annealing equipment will cost about *	$ 45,000.00

Die Room

Complete die room equipment for servicing dies for drawing 60 metric tons of wire per day, including accessories, will cost approximately	10,000.00

Other Equipment

Other equipment required will include ram and fork trucks, stripper cranes, acid storage tanks, scales, balance, and other handling devices.	- -
Total - Machinery and Equipment for Producing Wire	$640,905.00

MACHINERY AND EQUIPMENT

FOR PRODUCING FENCING WIRE

(Figure 4)

In order to manufacture the various kinds of fencing wire and similar products, several different kinds of machines are required. The following are brief descriptions of these machines, together with estimates of their costs:

Interlocking, Wrapped, Stay Field and Poultry Fencing

For making standard weight farm fence with top and bottom wire of #10 gage and line and stay wires of #12-1/2 gage, the Interlocking Fence Company Loom No. 1155 is suggested. This machine will occupy a floor space of approximately 14 × 8 feet. Fully equipped with a 15 hp., 60-cycle, 440-volt, 3-phase motor, with controls, it will cost approximately**	$42,000.00

* Estimate of Lee Wilson Engineering Co., Inc., Cleveland, Ohio, manufacturers of bell-type annealers.

** Interlocking Fence Company, 252 West Adams Street, Morton, Illinois.

For the manufacture of poultry and garden fence in both 48 and 58-inch heights, using #11 gage top and bottom wires and line and stay wires of #14-1/2 gage, the Interlocking Fence Company Loom No. 2158 is suggested. This machine occupies a floor space of approximately 14 × 8 feet and requires a 15 hp., 60-cycle, 440-volt, 3-phase motor. Estimated cost is: $ 44,000.00

Chain Link Fence (Figure 5)

Most of the major steel companies, as well as the large makers of chain link fence, have developed their own designs of looms. However, Bergandi Manufacturing Co., Inc., El Monte, California, makes a universal and automatic loom suitable to the needs of a fence producer desiring to engage in a moderate volume output.

This machine is made in only one model. It weaves fencing of 30 to 144 inches high, using wire gages of from #12 to #6, and turns out fence with 1-1/2-inch to 3-inch mesh. The loom may be readily adjusted to produce various dimensional sizes. It will barb both edges, knuckle both edges, or bar one edge and knuckle the other.

This machine will produce from 10,000 to 12,000 square feet of 4-inch fabric in 8 hours of operation and from 12,000 to 14,000 square feet of 6-inch or larger fabric during each day of 8 hours.

This machine without motors and controls will cost approximately (at the factory): $ 11,000.00

Welded Wire Fabrics (Figure 6)

Resistance welding equipment is used to produce most types of concrete reinforcing wire, ordinary kinds of unwoven fencing, and similar wire products. There are four American firms making this type of equipment. Individual firms' specifications and prices vary quite widely. Therefore, in order to provide enough basic information for the prospective investor or operator to form an opinion concerning the desirability of acquiring such equipment, details on a Sciaky welder are presented below:*

* Sciaky Bros., Inc., 4915 West 67th Street, Chicago 38, Illinois.

Specifications

Sciaky Type MGT-12 Automatic Wire Mesh Welding Machine

The Type MGT-12 Automatic Wire Mesh Welder is arranged for straight-in-line production operation for welding wire mesh fabricated from round wire from a minimum of #16 wire to a maximum of 3/8-inch wire, or from flat wire, permitting various combinations of mesh spacing and of mesh width up to a maximum of six feet.

Machine contains 12 hydraulic pressure heads with die blocks, each arranged for welding one or more simultaneously, so that flexibility of spacing is achieved.

Machine operates on a three-phase system which reduces the power demand to a minimum, balances the load on the power supply, with a power factor of at least 85 percent. Because of the three-phase system, uniform current distribution is achieved on all die blocks, and direct welding is obtained, which permits the loading of the wire from above.

General Description

Machine is of welded steel construction, heavily reinforced to maintain original alignment. The welding pressure heads are mounted on a welded box frame bridge so that the wire may be fed directly through the machine. Twelve heads are provided, mounted on the machine surface for accurate alignment. The lower mandrel contains an easily replaceable insert for rapid change and simplification of maintenance. The clamping and feeding mechanism is located directly behind the welding heads. The transformers are mounted in the lower portion of the structure and are completely enclosed and protected against flash. A feed trough is provided for feeding the transverse wires.

Welding Specifications

Transformer rating at 50% duty cycle: 450 KVA (2 transformers are provided.)

Maximum electrode force per head (12 heads): 4,700 lbs.

Welding range: Minimum #16 wire and a minimum spacing of 1/4-inch, center to center.
Maximum 3/8-inch wire and a minimum spacing of 1-inch, center to center.
Various combinations of flat wires can also be welded; for example, 1/8-inch X .047 inch flat at 1-1/2-inch spacing; 5/16-inch X .054 inch flat at 2-inch spacing; 3/8-inch X .062 inch flat welded to .062 inch round at 1-1/4-inch spacing, etc.

Stroke indexing and feeding piston: Incrementally adjustable to a maximum of 16 inches.

Maximum peak KVA demand at maximum output: 850 KVA, 3-phase at 80% power factor.

Electrical System

Welding current for the 12 die blocks is obtained from two 3-phase welding transformers. Interruption of the current is achieved by means of ignition tubes. The control is composed of two 3-phase firing systems designated as left and right firing systems. Each system controls one of the two welding transformers. The left-side firing system controls the welding transformer under the six hydraulic heads located on the left side of the machine. The right-side firing system controls the welding transformer under the six hydraulic heads located on the right side of the machine.

The current-conducting secondary cables are connected to the welding dies of each head by means of special connectors. There are six connectors on the left side and six connectors on the right side. The control also operates the special feeding device integrating its function with the welding sequence.

By means of selector switches, various combinations of welding sequences can be obtained, depending upon the pattern of the mat to be welded. The machine may be operated in the following combinations:

1. The machine can be operated with firing on the right side of the machine only.

2. The machine can be operated under "Repeat" or "Non-Repeat" conditions.

3. The machine can be operated with or without the indexing device.

4. The indexing device can be operated with or without the welding performance proper. This provides an index of any length desired in multiples of the pre-set stroke of the index piston. A release button is provided to stop the firing, raise all heads after performance of "Hold" time, open the clamps and not interefere with the index.

5. Provisions are made for having different phase-shift settings on the last firing on both sides if desired. This permits the end dies to have fewer welds than the intermediate dies when necessary.

The controls are mounted as integral parts of the welding machine, and all dials, selector switches and other adjustments are convenient to the operator.

Operation of the Machine

The longitudinal wires are arranged on coils in the front of the welding machine. The transverse wires are loaded in the feed trough in front of, and directly above, the welding dies.

The longitudinal wire is in welding position; the clamps on the feeding mechanism are closed, gripping the longitudinal wires behind the welding dies; the 12 welding heads apply electrode force simultaneously. During the welding operation and while the material is held by the welding heads, the clamps open, the index advances forward, and the clamps re-close. At the end of the welding, all heads retract simultaneously, and the index is returned to the rear at its initial position with clamps closed.

The welding proper is preceded by a "squeeze" time period to permit the pre-set electrode force to be attained, and is followed by a "hold" time. The welding proper, however, can be performed according to a predetermined sequence of operation. Normally, all heads are energized simultaneously, but any head or combination of heads can be made nonoperative to provide variations in the pattern of the mat.

One-half of the machine only can be operated, or only two heads, or any number of heads up to the maximum number, depending upon the welding job to be performed. A reduced phase-shift may be introduced so that the two end heads need not weld the same number of wires as the intermediate heads.

The domestic factory price of the Sciaky Type MGT-12 Automatic Wire Mesh Welding Machine is approximately $80,000.00.

Barbed Wire Making Equipment

Large steel mills and important producers of barbed wire fencing generally use equipment of their own individual designs or designs which are modifications of standard makes.

Following are specifications and prices of a widely used line of machines:

Glader Barbed Wire Machines* (Figure 7)

Machine	Arranged for Belt Drive	Arranged for Motor-Drive Less Only Motor and Starter	Complete With Motor and Starter	Export Boxing Charge
Model A: To make one style or type of 2-point wire only	$ 2,937	$ 2,990	$ 3,307	$ 113
Model B: To make one style or type of 4-point wire only	3,142	3,200	3,625	113
Model C: Combination machine to make one style of 2-point wire, with extra parts to make one style of 4-point wire; also can be arranged to make any two styles of either 2-point or 4-point wire	3,395	3,444	3,757	113
Automatic-stop measuring device (used for making measured bundles), furnished for motor-equipped machines only				400
Additional spacing wheels, each				22
Extra parts to make other styles of wire in addition to the styles for which machines are equipped (lot)				119

Each machine is equipped with two spacing wheels, four wire baskets and a wire standard or guide sheave.

By eliminating the barb feed, any of the three models may be used to make two-strand plain cable wire.

* Manufactured by the William Glader Machine Works, 210 North Racine Avenue, Chicago, Illinois.

To change from making one style of wire to another requires about 15 minutes. Spacing wheels can be changed in about five minutes.

Three models of machines are manufactured for making barbed wire. These machines will also make two-strand plain cable wire by eliminating the barb feed.

Gages of wire used are:	Strand wires:	12, 12-1/2, 13 or 14 gage
	Barbed wires:	13-1/2, 14, 15 or 16 gage

Machine for Making One Style or Type of Two-Point Wire (Model A)

Belt drive - gross weight:	3,150 lbs.
Motor drive - gross weight:	3,650 lbs.
Box dimensions, either belt drive or motor drive:	38 X 96 X 55 inches

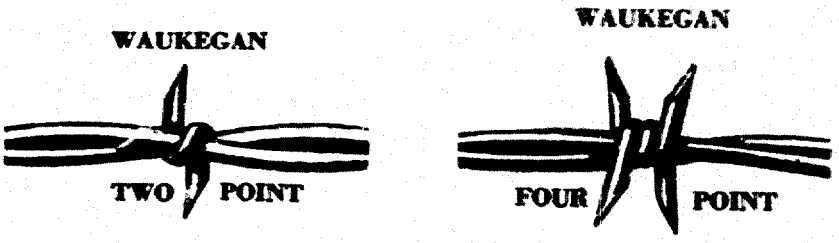
Machine for Making One Style or Type of Four-Point Wire (Model B)

Belt drive - gross weight:	3,300 lbs.
Motor drive - gross weight:	3,800 lbs.
Box dimensions, either belt drive or motor drive:	41 X 96 X 55 inches

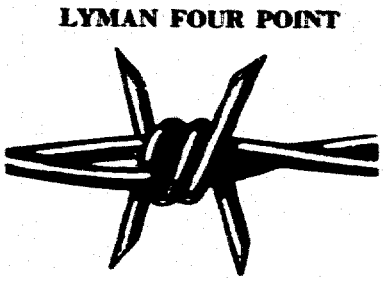
Styles or Types of Barbed Wire

Manufacturers use different trade names, but there are four generally used styles or types of barbed wire:

Waukegan: Either two or four-point. Barbs are rolled half-round as each barb is measured. Barbs are wrapped once around the main strand and flattened on the side next to the strand on which they are twisted. This makes a single wrap for two-point and a double wrap for four-point.

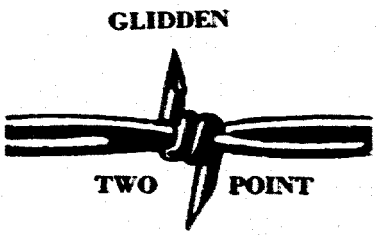


Lyman: Four-point only. One barb is fitted or fed between the two strands, wrapped around one strand and then again around both strands. The other barb is interlocked and wrapped around both strand wires. Also known as Cactus style wire.



Iowa: Can be either two-point or four-point. Same in general construction as Lyman. The two-point style is made by simply eliminating one of the barbs in the feed.

Glidden: Can be either two-point or four-point. Barbs are shorter than other styles, their length controlled by changing number of teeth on the feed ratchet. Barbs are round and wrapped twice around one main strand. In four-point style, both barbs are coiled around one main strand, the second strand wire being joined to the one carrying the barbs before latter enters twister.



MACHINERY AND EQUIPMENT

FOR PRODUCING

WIRE GARMENT HANGERS

Several American firms make various types of wire forming machines for manufacturing garment hangers and novelty products. The following specifications and price of one such machine may provide some idea of their possible usefulness in the project under consideration:

Wichita Wire Garment Hanger Machine*
Complete with 2 hp. motor and controls.
Furnished with one wire reel.
Capacity: 2,000 hangers per hour.
Makes standard 16-inch wire hangers.
Straightens and cuts wire to proper length.
Forms hanger, kicks it off on a bar.
Gage range: #12 to #13, inclusive.

Factory cost	$ 4,950.00
Boxing charge	100.00
Total cost	$ 5,050.00

MACHINERY AND EQUIPMENT

FOR PRODUCING FLY SCREEN

Since it is contemplated to produce wire gages small enough to make fly and insect screen, the following specifications and prices are presented:

Mummert-Dixon,** 36-inch Fly Screen Loom No. 239 has steel shell warp drums with two adjustable spacing rings 2-1/8-inch high to provide for various widths of weaving, and change gears for weaving 12, 14, 16 and 18 meshes per inch.

The price of this machine, including a 1-hp., 3-phase, 60-cycle, 440-volt motor and controls, is approximately $3,990, boxed for export. The price does not include reeds, heddles or bobbins which are usually purchased in varying quantities, depending upon the user's individual requirements.

---

* Quotation supplied by Seybold Transworld Exporters, 122 East 42nd Street, New York 17, New York.

** Mummert-Dixon Company, Hanover, Pennsylvania.

MACHINERY AND EQUIPMENT

FOR PRODUCING NAILS AND STAPLES

Glader Wire Nail Machines* (See Figure 9)

Machine Model	Arranged For Belt Drive	Arranged For Motor Drive Less Only Motor	Complete With Motor and Starting Equipment	Export Boxing Charge	Extra Grip Dies (Pair)	Extra Point Cutters (Per Pair)	Each Heading Hammers
No. 00a	$ 2,345.00	$ 2,477.00	$ 2,580.00	$ 65.00	$ 12.90	$ 16.75	$ 15.60
No. 00	2,395.00	2,554.00	2,710.00	73.00	12.90	16.75	15.60
No. 0	2,846.00	3,028.00	3,234.00	88.00	14.20	17.95	17.45
No. 1	3,265.00	3,456.00	3,718.00	97.00	15.50	19.25	19.15
No. 2	4,102.00	4,343.00	4,684.00	110.00	16.75	20.60	20.80
No. 3	6,338.00	6,650.00	7,100.00	122.00	17.95	21.90	24.20
No. 3-S	6,338.00	6,650.00	7,100.00	122.00	17.95	21.90	35.10
No. 3-A	7,440.00	7,844.00	8,291.00	132.00	50.25	21.90	24.20
No. 4	10,527.00	11,036.00	11,697.00	154.00	23.20	25.50	30.25
No. 4-S	11,713.00	12,232.00	12,900.00	176.00	23.20	25.50	30.25
No. 5	14,089.00	14,748.00	15,500.00	308.00	72.60	30.80	72.60
Nail Die Grinder	293.00		818.00	29.00			
200-lb. Tumbler	727.00		1,125.00	36.00			
1,000-lb. Tumbler	1,441.00		2,103.00	87.00			

* Wm. Glader Machine Works, 210 North Racine Avenue, Chicago 7, Illinois.

Included in the price of each machine are one pair of gripping dies, one pair point cutters and one heading hammer. Hammer prices cover header tools for plain nail heads. To make checkered or oval heads, add $1.25 extra per hammer.

There are 11 models of Glader machines for making a full range of nails from round or square wire in lengths from 1/4-inch brads to 12-inch spikes.

Accessories: Each machine is furnished with one heading hammer, one pair point cutters and one pair grip dies for the largest gage (diameter) of wire used on that model unless specified otherwise. Grip dies must be changed for each gage of wire used. Point cutters will cut or point all gages of wire within each model's range. Heading hammers will work on all sizes of wire within each model's range, but the header tool must be changed for different types of nail heads.

Specifications

Glader Wire Nail Machines	No. 00A	No. 00	No. 0
	#16 to #22	#14 to #22	#12 to #18
Capacity - Gage of wire	(BWG .065 to .028)	(BWG .083 to .028)	(BWG .109 to .049)
- Length of nails	1/4 to 1-1/8-inch	1/4 to 1-1/4-inch	1/2 to 1-3/4-inch
Number of nails per minute	700	550	450
Size of pulleys	8 X 2-1/2 inches	8 X 2-1/2 inches	10 X 2-1/2 inches
hp. required for belt drive	1/2	3/4	1
hp. required for motor drive	1 at 1,800 r.p.m.	2 at 1,200 r.p.m.	3 at 1,200 r.p.m.
Floor space occupied - belt drive	40 X 36 inches	44 X 38 inches	51 X 46 inches
Floor space occupied - motor drive	34 X 36 inches	35 X 49 inches	43 X 57 inches
Net weight - belt drive	900 lbs.	1,225 lbs.	1,665 lbs.
Net weight - motor drive	975 lbs.	1,440 lbs.	1,900 lbs.
Gross weight - belt drive	1,150 lbs.	1,600 lbs.	2,085 lbs.
Gross weight - motor drive	1,225 lbs.	1,775 lbs.	2,325 lbs.
Dimensions packing case - belt drive	33 X 37 X 32 inches	39 X 46 X 44 inches	40 X 53 X 46 inches
Dimensions packing case - motor drive	33 X 37 X 32 inches	49 X 40 X 44 inches	50 X 47 X 46 inches

Specifications (Cont'd)

Glader Wire Nail Machines	No. 1 #10 to #14	No. 2 #8 to #12	No. 3 #4 to #10
Capacity - Gage of wire	(BWG .134 to .082)	(BWG .165 to .109)	(BWG .238 to .134)
- Length of nails	1/2 to 2-1/2 inches	1/2 to 3-1/2 inches	1/2 to 5 inches
Number of nails per minute	400	325	225
Size of pulleys	12 X 3-1/2 inches	12 X 4-1/2 inches	20 X 4-1/2 inches
Hp. required - belt drive	2	3	5
Hp. required - motor drive	5 at 1,200 r.p.m.	7-1/2 at 1,200 r.p.m.	10 at 900 r.p.m.
Floor space occupied - belt drive	60 X 59 inches	65 X 67 inches	72 X 74 inches
Floor space occupied - motor drive	50 X 74 inches	53 X 82 inches	60 X 90 inches
Net weight - belt drive	2,880 lbs.	3,350 lbs.	5,000 lbs.
Net weight - motor drive	3,200 lbs.	3,740 lbs.	5,585 lbs.
Gross weight - belt drive	3,500 lbs.	4,000 lbs.	5,700 lbs.
Gross weight - motor drive	3,815 lbs.	4,400 lbs.	6,300 lbs.
Dimensions packing case, belt drive	52 X 60 X 48 inches	60 X 65 X 51 inches	75 X 72 X 54 inches
Dimensions packing case, motor drive	61 X 52 X 48 inches	72 X 55 X 51 inches	75 X 62 X 54 inches

	No. 3-S (Roofer)*	No. 3-A (Duplex)
Capacity - Gage of wire	(BWG .238 to .082) #4 to #14	(BWG .238) #4 and smaller
- Length of nails	1/2 to 3 inches	To 5 inches from underside of top head to point.
Characteristics of nail heads	5/8-inch head on #9 wire (BWG .148) 1/2-inch head on #10 wire (BWG .134) 7/16-inch head on #11 wire (BWG .120)	
Number of nails per minute	325	140
Size of pulleys	20 X 4-1/2 inches	24 X 4-1/2 inches
Hp. required for belt drive	5	5
Hp. required for motor drive	10 at 1,200 r.p.m.	7-1/2 at 900 r.p.m.
Floor space occupied - belt drive	72 X 74 inches	76 X 69 inches
Floor space occupied - motor drive	60 X 88 inches	70 X 70 inches
Net weight - belt drive	5,000 lbs.	5,700 lbs.
Net weight - motor drive	5,485 lbs.	6,350 lbs.
Gross weight - belt drive	5,700 lbs.	6,400 lbs.
Gross weight - motor drive	6,200 lbs.	7,150 lbs.

	No. 3-S (Roofer)*	No. 3-A (Duplex)
Dimensions packing case - belt drive	64 X 72 X 54 inches	65 X 80 X 54 inches
Dimensions packing case - motor drive	73 X 62 X 54 inches	66 X 75 X 54 inches

* The No. 3-S is like the standard No. 3 machine except that the Crankshaft-throw is shortened to uprate machine to 325 nails per minute. The feed-lever is slightly different; the header tool is stronger and heavier, and the flywheel end of the crankshaft is heavier.

	No. 4	No. 4-S (Special)	No. 5
	#1 to #8	5/16-inch to #8	3/8-inch to #8
Capacity - Gage of wire	(BWG .300 to .165)	(.3125 to BWG .165)	(.375 to BWG .165)
- Length of nails	1 to 7 inches	2 to 9 inches	2 to 12 inches
Number of nails per minute	190	175	160
Size of pulleys	26 X 6 inches	26 X 6 inches	36 X 6 inches
Hp. required for belt drive	7-1/2	10	15
Hp. required for motor drive	15 at 900 r.p.m.	15 at 900 r.p.m.	20 at 900 r.p.m.
Floor space occupied - belt drive	92 X 91 inches	93 X 97 inches	105 X 124 inches
Floor space occupied - motor drive	78 X 91 inches	78 X 97 inches	93 X 124 inches
Net weight - belt drive	9,300 lbs.	10,500 lbs.	14,000 lbs.
Net weight - motor drive	10,300 lbs.	11,500 lbs.	15,400 lbs.
Gross weight - belt drive	10,600 lbs.	11,800 lbs.	16,000 lbs.
Gross weight - motor drive	11,700 lbs.	12,900 lbs.	17,600 lbs.
Dimensions packing case - belt drive	78 X 91 X 62 inches	84 X 92 X 62 inches	(Must be disassembled
Dimensions packing case - motor drive	78 X 80 X 62 inches	78 X 86 X 62 inches	and packed in two cases for shipment.)

Tumbling Barrels: Now available with special motor geared to slow operating speeds.

200 lb. barrel: net weight 800 lbs.; gross weight 975 lbs.; dimensions 32 X 55 X 42 inches.

1,000 lb. barrel: net weight 1,800 lbs.; gross weight 2,250 lbs.; dimensions 45 X 45 X 66 inches.

ECONOMICS OF A WIRE MILL

AND FENCE MAKING OPERATION

Magazines such as Iron Age* and Steel** provide weekly quotations and price indices which show the price spread between wire bars (the raw material used in wire drawing operations) and the selling prices of finished wire products.

The price quoted for wire rod and skelp (the raw materials) for the week of December 11, 1956 was $5.80 per hundredweight. The quoted price of finished bright wire for the same period was $7.20 per hundredweight. The difference between these two prices represents the spread from which a wire mill would have to absorb all manufacturing costs and accrue a profit.

Wire mill costs would include the basic cost of raw materials, transportation and import charges, cost of liming, pickling, annealing, drawing, cleaning, galvanizing, packaging, supervision and wastage. All these costs would vary according to the size and character of wire produced and the character of management and supervision exercised.

It is, therefore, quite difficult to prepare a pro forma income and expense statement covering a proposed wire drawing operation before ascertaining the specific nature of the products to be produced, the scope and character of facilities to be procured, actual prevailing prices of raw materials and current selling prices of finished products, as well as how well qualified both management and supervisory forces are to operate proficiently.

With a sufficient amount of time and study devoted to the above mentioned factors, it should be possible to compile data sufficiently accurate to determine the feasibility of establishing a wire products operation in a specific locality.

---

* Published by the Chilton Co., Chestnut and 56th Streets, Philadelphia 39, Pennsylvania.

** Published by the Penton Publishing Co., Penton Building, Cleveland 13, Ohio.

TECHNICAL ASSISTANCE

"TURN-KEY" OPERATION

There are American firms who accept, on a fee basis, the responsibility for making preliminary technical and economic studies on a plant to manufacture wire products. These firms make projected and final engineering designs, supervise construction, give technical start-up assistance and operate the plant long enough to train the supervisory and working forces. Among such firms are:

Mesta Machine Company
P. O. Box 1466
Pittsburgh 30, Pennsylvania

Kaiser Engineers, Inc.
Kaiser Building
Oakland 12, California

Wean Engineering Co., Inc.
347 North Park Avenue
Warren, Ohio

Arthur G. McKee and Co.
East 23rd Street at Chester Avenue
Cleveland, Ohio

Morgan Construction Co.
Worcester, Massachusetts

The Morgan Construction Co. was requested to furnish the following brief outline of the services they are prepared to render. This may serve to illustrate the nature and cost of such services.

> The Morgan Construction Co. is prepared to give technical assistance in the coordination of the building of the new wire mill.
>
> The Morgan Construction Co. will provide, in the event of a contract, the following services:
>
> 1. Detailed arrangement drawings of:
>
> a. Rod unloading and storage area.
> b. Cleaning house.
> c. Wire drawing department arrangement of machines, etc.
> d. Galvanizing department arrangement of equipment, etc.

e. Annealing department arrangement of equipment, etc.
f. Barb wire mill arrangement of equipment, etc.
g. Link chain fence mill arrangement of equipment, etc.
h. Nail mill arrangement of machines, etc.
i. Packaging and shipment areas.
j. Warehouse.
k. Space for future expansion.

2. Piping arrangement drawings for:

Cleaning House

a. Water
b. Acid
c. Steam
d. Sewer
e. Oil

Galvanizing Department

a. Oil
b. Water
c. Sewer

Wire Drawing Department

a. Water
b. Sewer

Annealing Department

a. Water
b. Sewer

. Electrical conduit arrangement drawings; location of and capacity required for power lines throughout the mill. No lines for lighting or specifications for lighting are included.

4. Cranes: Location of and capacity of all cranes required.

All drawings for buildings, piping, cranes, and electrical conduits specified above are arrangement drawings only and are not detailed for construction.

:cifications of equipment in all departments are in sufficient tail to enable the customer to obtain bids for same.

he Morgan Construction Co. will also assist the customer in .he evaluation of all bids.

The specifications for equipment will include that required for:

Cleaning House	Die Inventory
Galvanizing	Wire Drawing Lubricants
Nails	Cranes
Barb Wire	Transportation Equipment Within Plant
Link Chain Fence	Scales
Die Room	Packaging and Wrapping Equipment

The Morgan Construction Co. is prepared to show the customer equipment similar to that they specify, in operation in various wire mills in the United States in order that the capacity and production equipment may be checked as suitable for the work required.

The Morgan Construction Co. will see that foundation drawings are supplied for all equipment used in the mill, as well as lubrication and operating instructions for the same.

The Morgan Construction Co. 's offer does not include the purchasing of any equipment.

The Morgan Construction Co. does not assume responsibility for the operation of any of the equipment specified, except that built or furnished by the Morgan Construction Co.

For technical assistance and engineering services, as outlined above, in connection with the establishment of a wire mill, the cost is approximately $75,000.

Technical Assistance in Operating Mill

The Morgan Construction Co. is prepared to offer technical assistance, relative to the operation of equipment, at the time the mill is started up. Such assistance will be furnished at a per diem rate, plus travel and expenses, the rate to be determined at the time the assistance is required. However, it is estimated the cost of such assistance will be $2,500 a month, plus expenses, for one man.

It is estimated that a man's services will be required for a period of 6 to 12 months to get the mill into operation.

When complete detailed information is available, the Morgan Construction Company will be pleased to make a formal quotation on the equipment required.

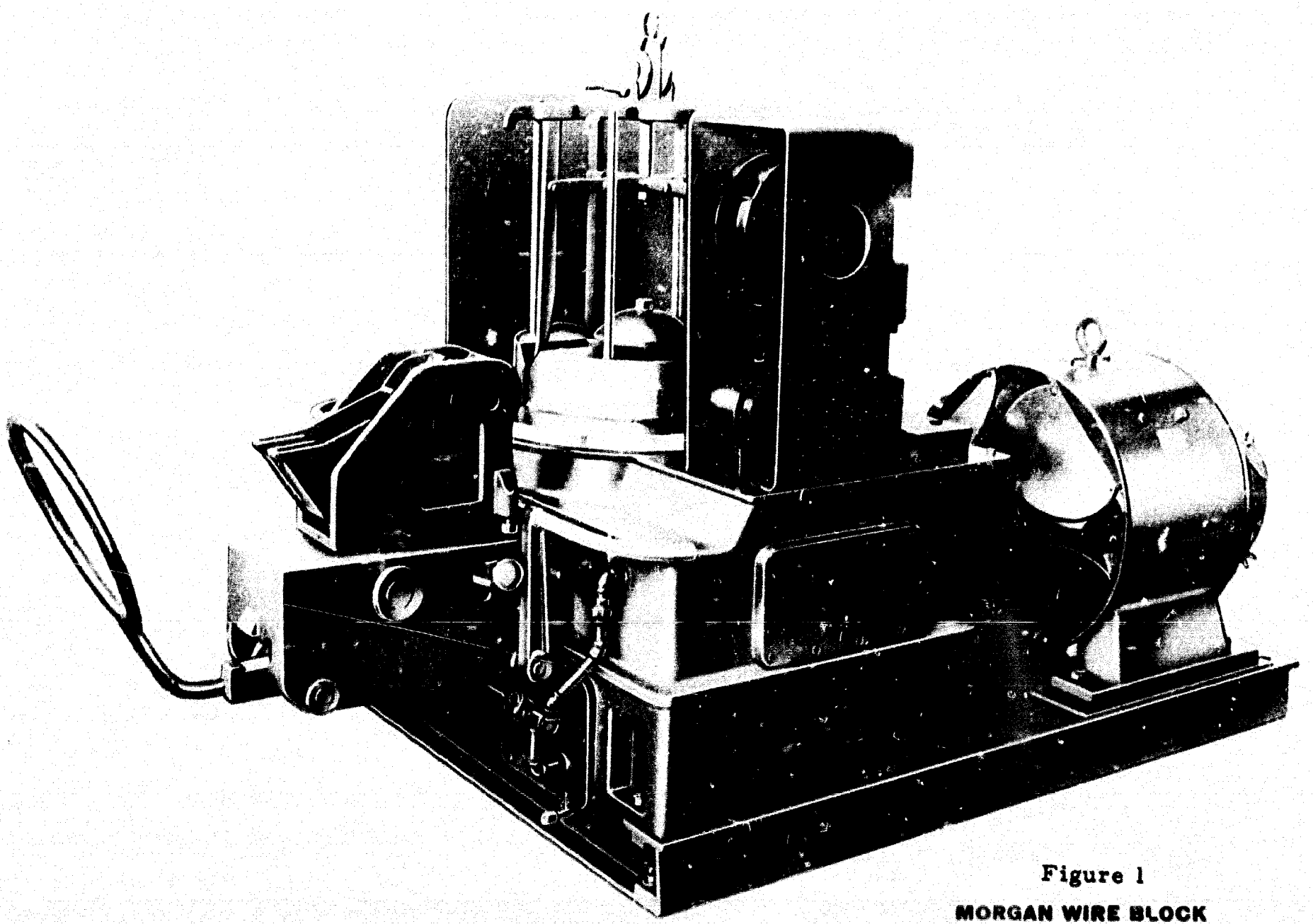


Figure 1

MORGAN WIRE BLOCK
PHOTO NO. 7159

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS, U. S. A.

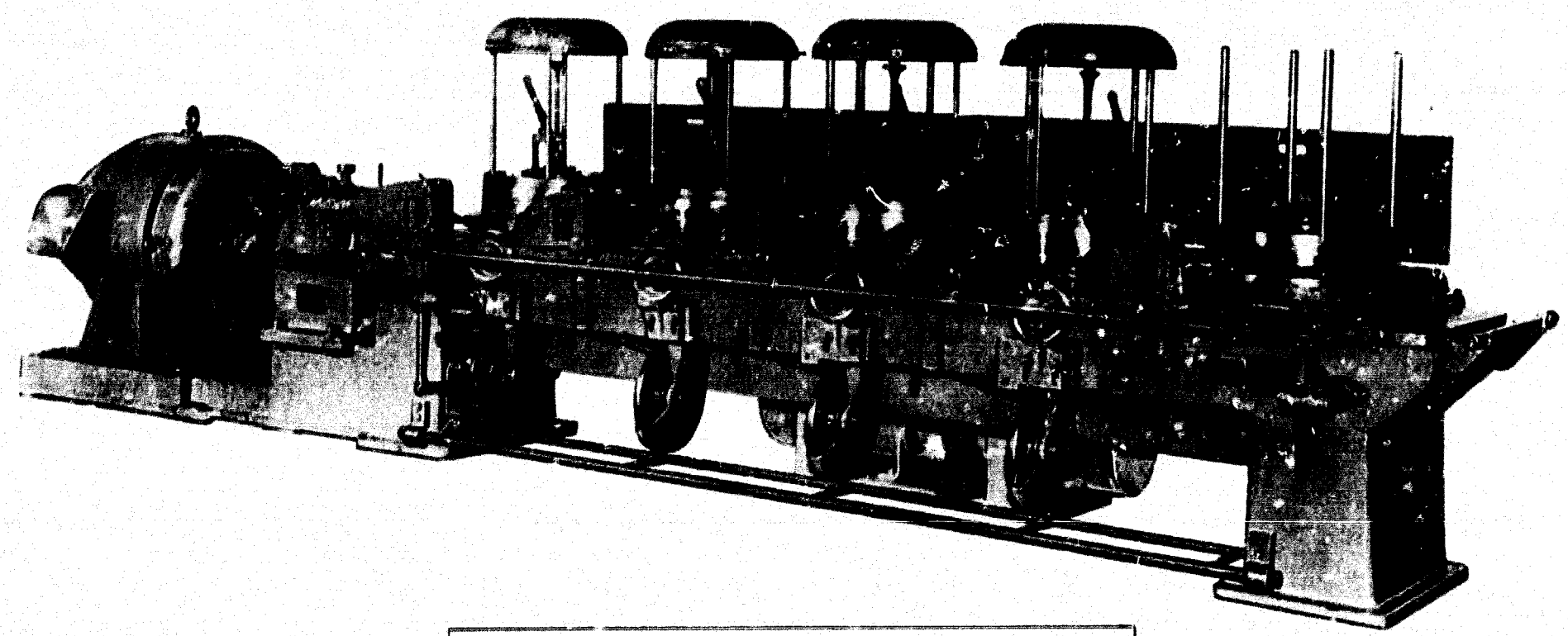


Figure 2

MORGAN-CONNOR WIRE MACHINE—TYPE B
PHOTO NO. 7156

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS, U. S. A.

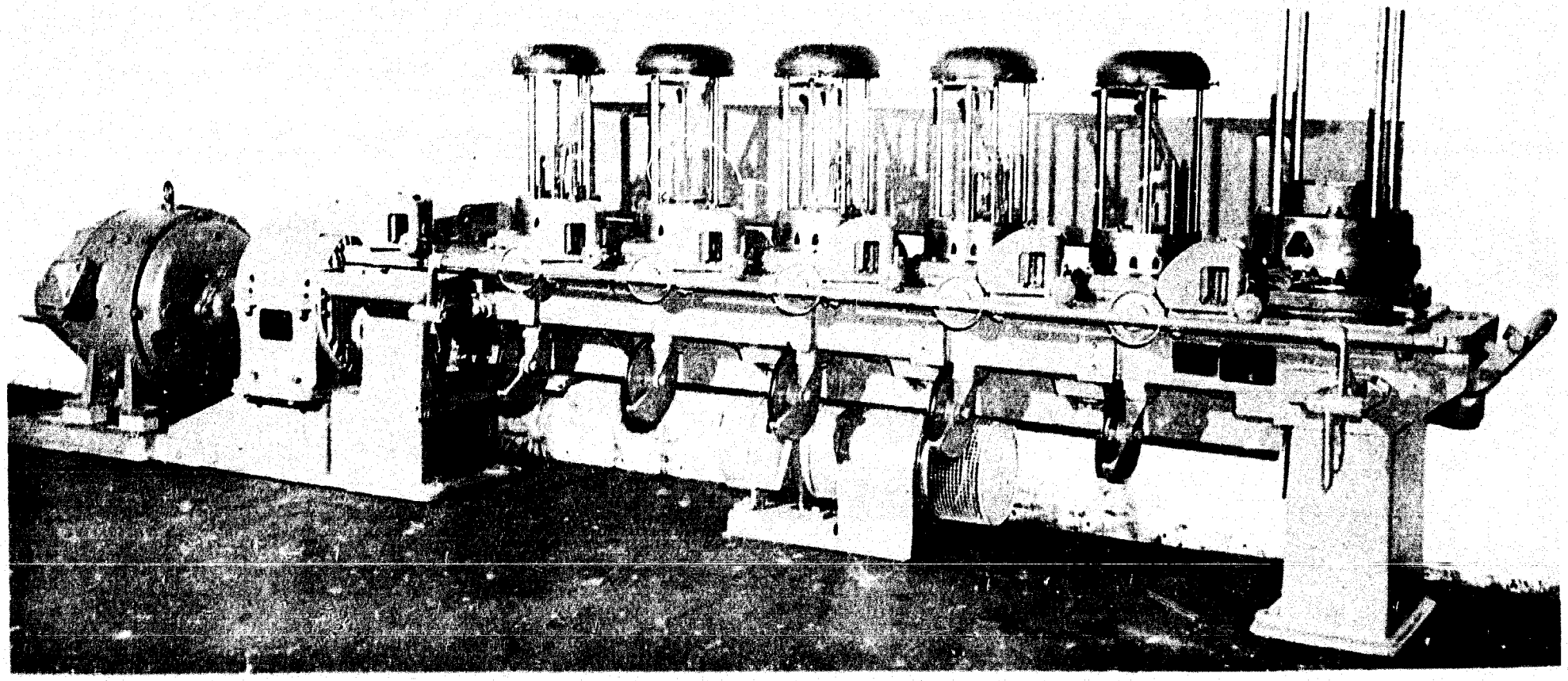


Figure 3

MORGAN - CONNOR WIRE MACHINE, TYPE C
PHOTOGRAPH NUMBER A - 46

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS.

Interlocking

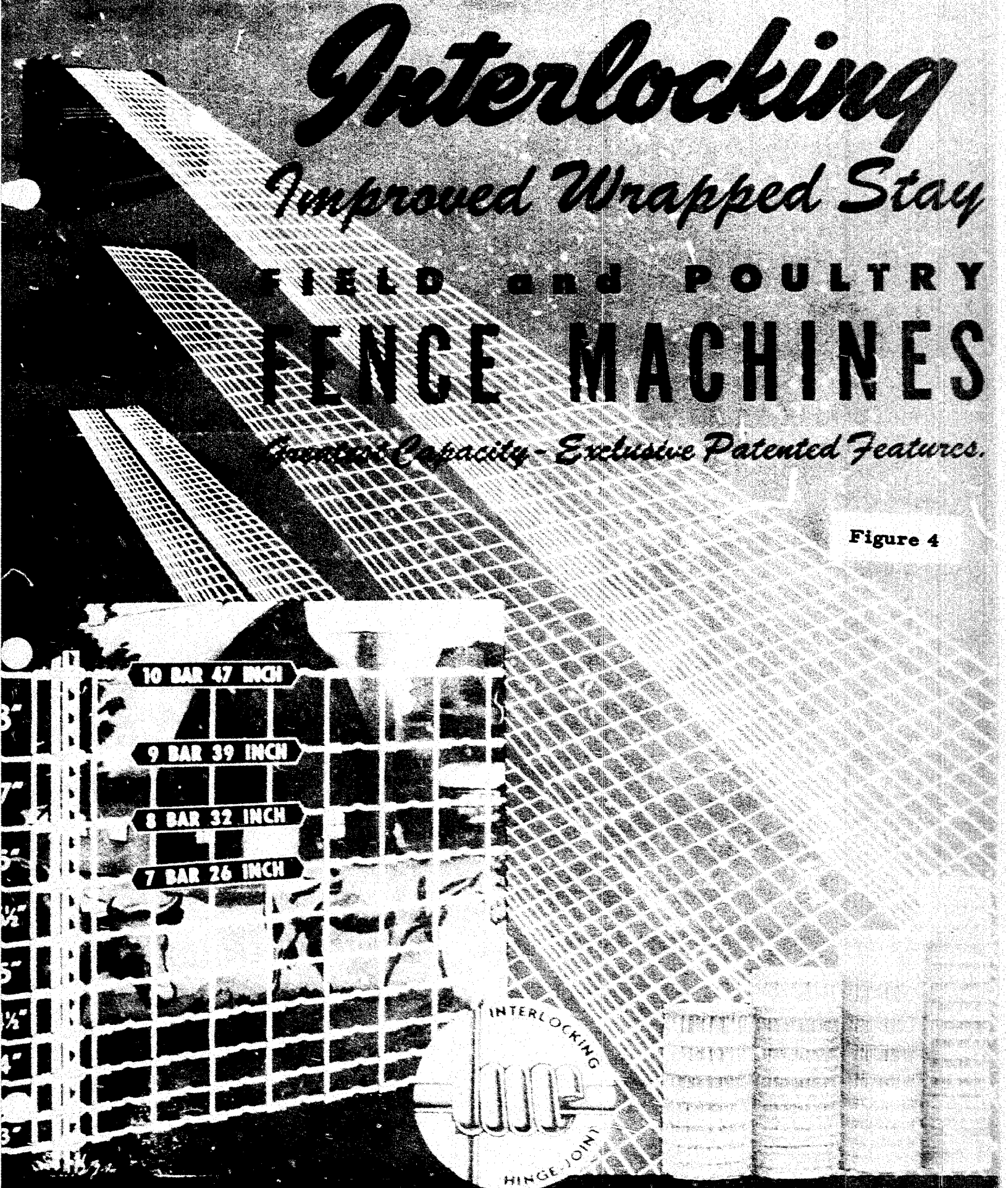
Improved Wrapped Stay

FIELD and POULTRY

FENCE MACHINES

Greatest Capacity - Exclusive Patented Features.

Figure 4



INTERLOCKING FENCE CO.

Established 1904 **MORTON, ILLINOIS, U. S. A.**

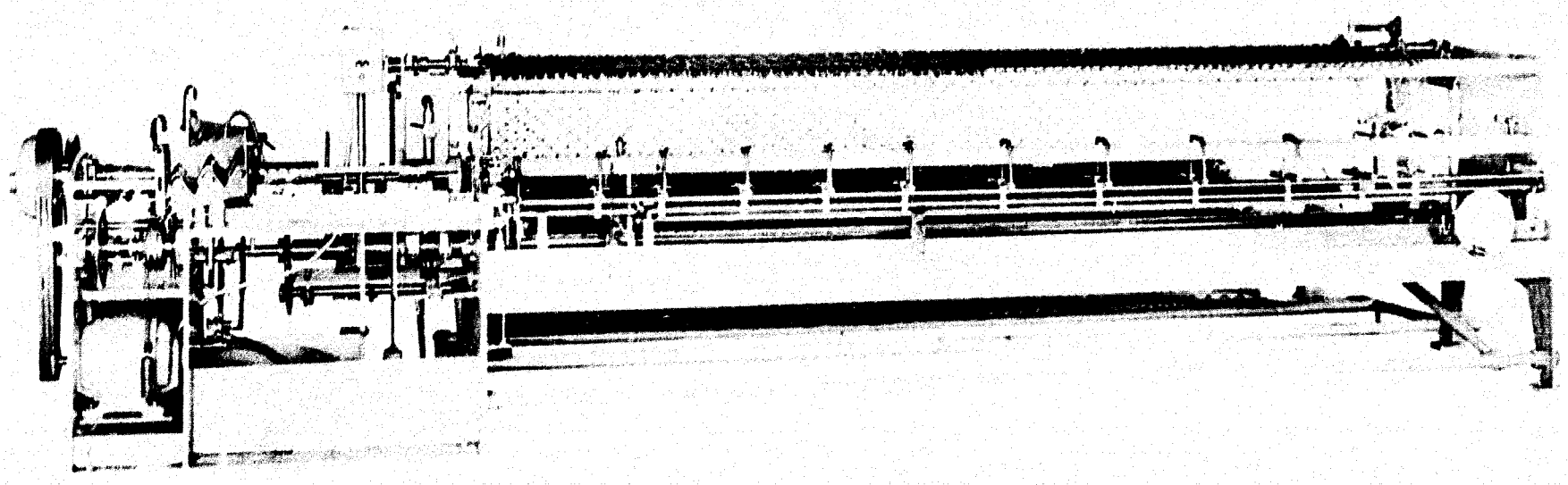


Figure 5

Bergandi Chain Link Wire Weaving Machine

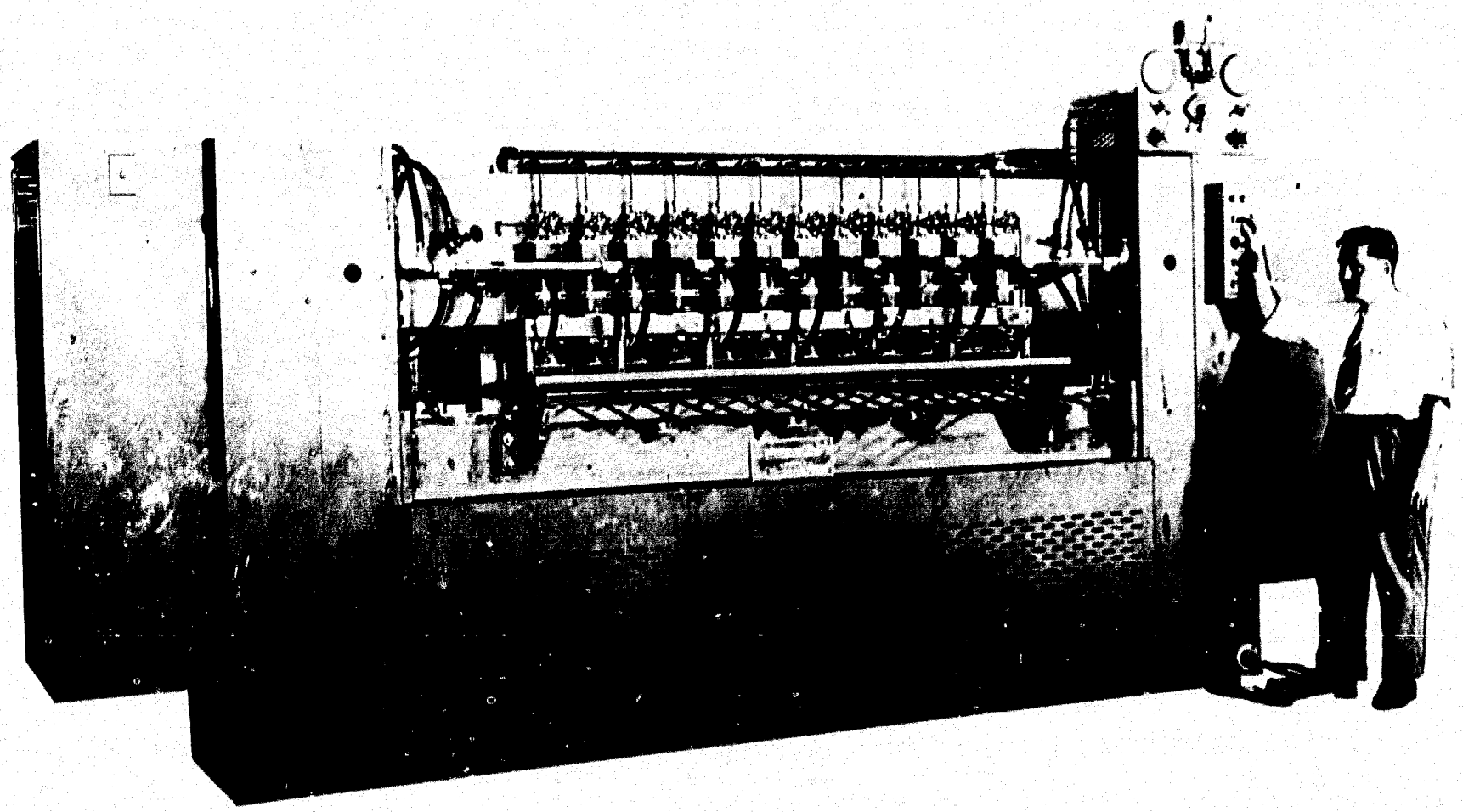
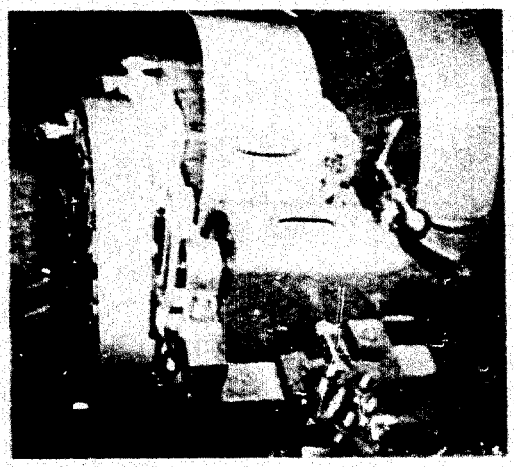


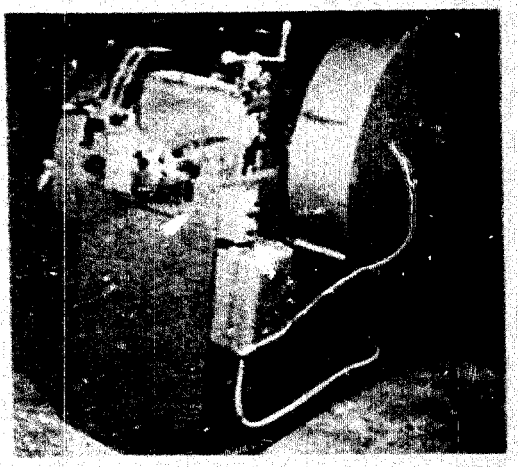
Figure 6

Sciaky Automatic Wire Mesh Welder

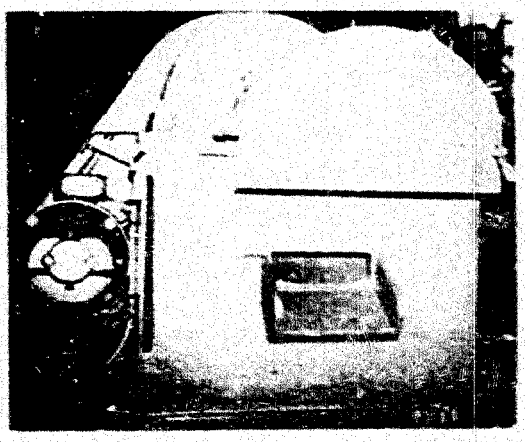
HUMPHREY RAPID STAPLE MACHINE



Above. Top View showing Wire Straightener and guarded Flywheel and Gears.



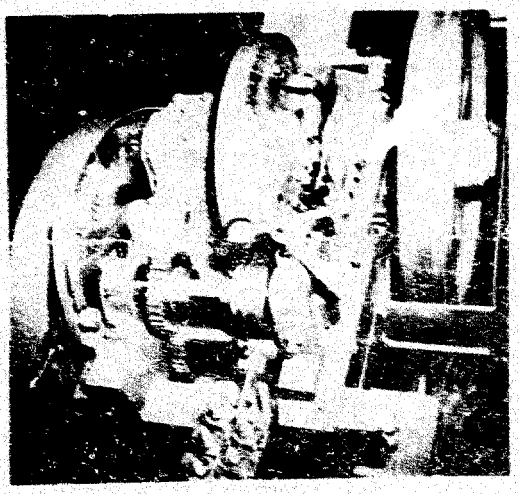
Above. Front View, motor equipped machine showing Wire Straightener and Starting Mechanism.

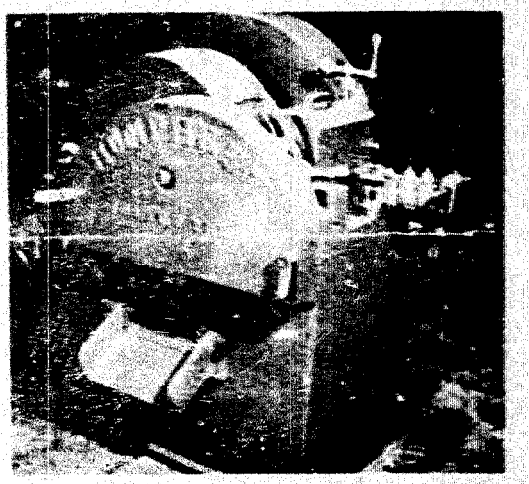


Below. Top View. Unguarded Flywheel and Gears showing easy adjustability of Machine.

Above. Side View. Motor-equipped machine showing Ejector Spout and position of motor. Note compact, sturdy construction.

Below. Side View showing Ejector Spout and Wire Straightener. Note minimum floor space required.





1000 STAPLES PER MINUTE – EFFICIENT – LOW MAINTENANCE COST.

Prompt deliveries now possible.

Sole Distributors

SEYBOLD TRANSWORLD EXPORTERS

CHANIN BLDG., 122 EAST 42nd STREET. NEW YORK 17, N. Y., U. S. A.

REG. CABLE ADD "SEYBOLDEX NEW YORK".

Figure 7

MUMMERT-DIXON

HIGH GRADE LOOMS

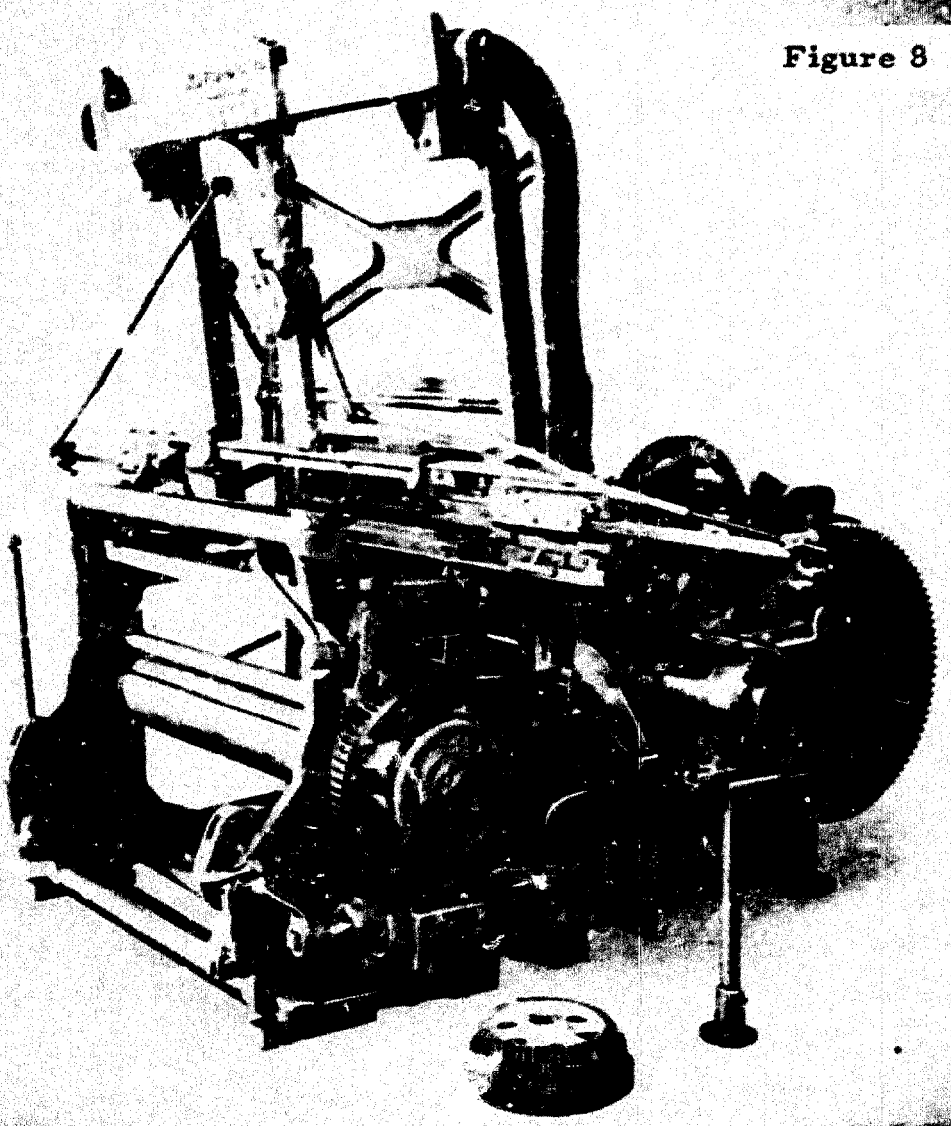


Figure 8

FLY SCREEN LOOMS

Type No. 239

Three Sizes: 36", 48", 72" Widths

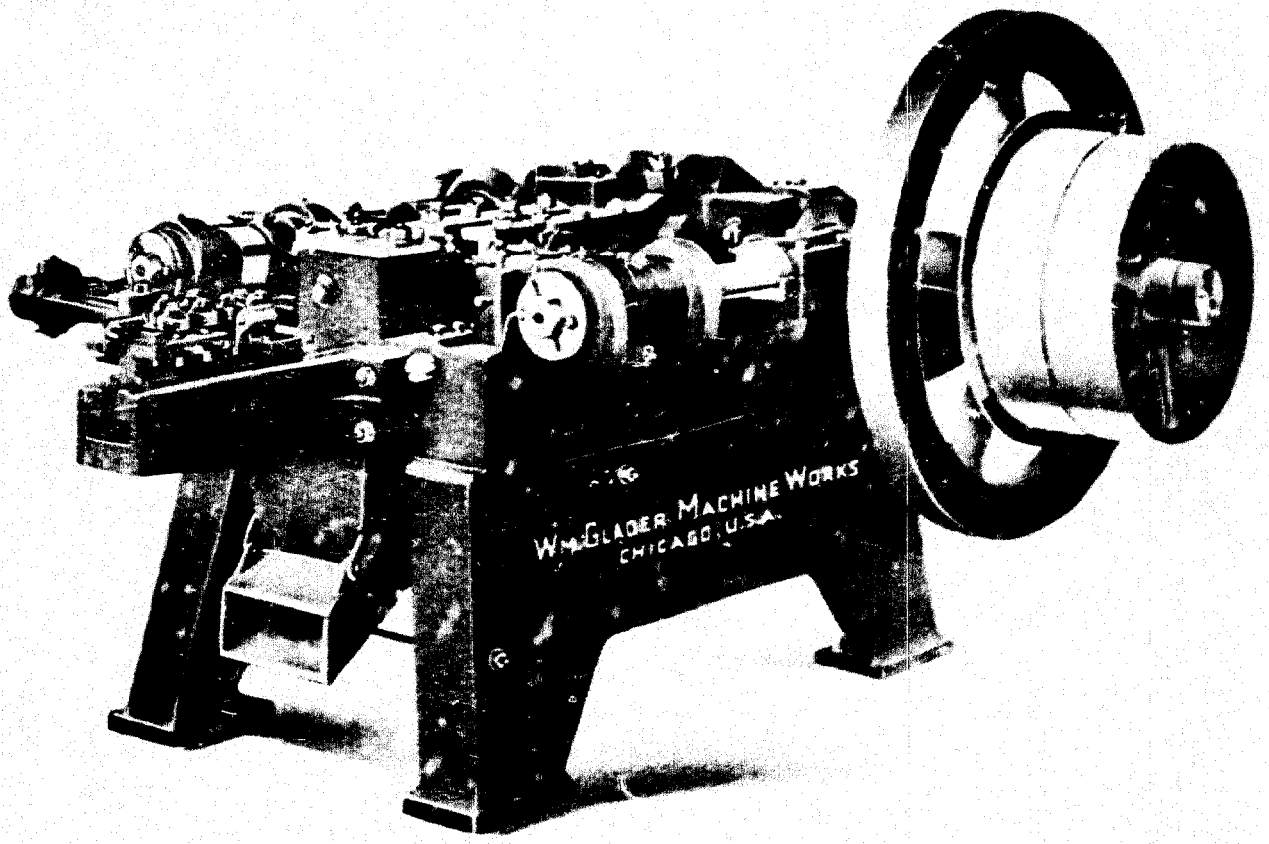
MUMMERT-DIXON COMPANY

HANOVER, PA. BULLETIN No. 9852

Figure 9

GLADER

WIRE NAIL MACHINE



WM. GLADER MACHINE WORKS

Established 1887

210 North Racine Avenue

CHICAGO 7, ILL., U. S. A.

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